Presented at the Special Libraries Association 2021 Conference (SLA 2021) as an on-demand session.

PDF of these slides (current document).

Megan Carlton

Learning data "naturally"

Engaging communities in the scientific process with iNaturalist

SLA 2021

Jo Klein

Takeaways

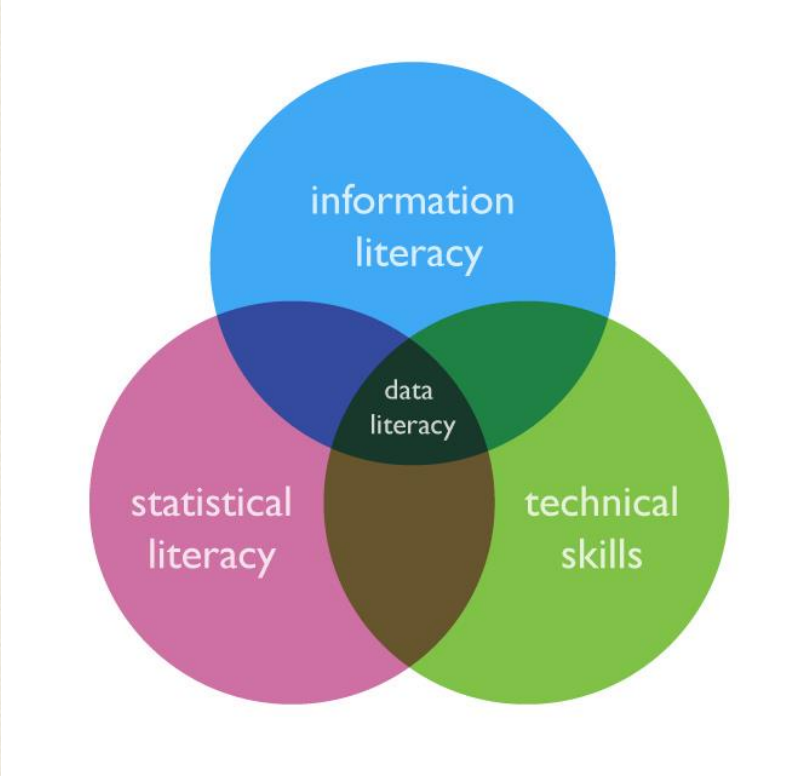
- What data literacy skills can be strengthened through citizen science projects.
- How citizen science projects facilitate data collection for use in research.
- What information is needed to collect, analyze, and retrieve data using the iNaturalist platform.

“Researchers use the data they collect to ‘introduce ideas, develop theories, or generate hypotheses that suggest connections or patterns in nature that can be tested,’ adding to the overall knowledge of the topic.”

(Carlton & Leininger, 2021)

(Research Cycle from Edinburgh Napier University "Research Cycle" Page)

Using data literacy to guide instruction



(Bounegru, 2012; image from Glusker, 2017)

1. Introduction to Databases and Data Formats
2. Discovery and Acquisition of Data
3. Data Management and Organization
4. Data Conversion and Interoperability
5. Quality Assurance
6. Metadata
7. Data Curation and Re-use
8. Cultures of Practice
9. Data Preservation
10. Data Analysis
11. Data Visualization
12. Ethics, including citation of data

Core competencies for data literacy

(Carlson et al., 2015)

1. Find (and discover)
2. Evaluate
3. Use
4. Credit
5. Create (and collect)

UNCG University Libraries learning goals

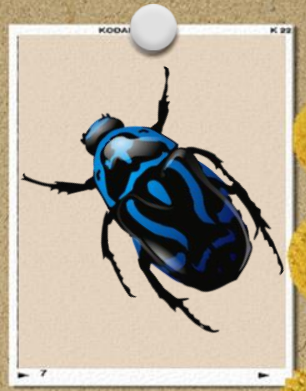
(Dale & Murphy., 2018)

What is Citizen Science?

The practice of public participation and collaboration in scientific research.

What is Citizen Science?

- Anyone can participate
- Protocols create high quality data
- Data help real scientists come to real conclusions
- Community of scientists and volunteers is open to all



Citizen science & the learner

Prepares learners students to:

- address real world complex problems
- use scientific methods
- critically evaluate the validity of data or evidence

Develops:

- quantitative skills, technical methods, and scientific concepts
- verbal, written, and graphical communication skills

(Manduka & Mogk, 2002)

(photo by NeONBRAND on Unsplash)

"The public's limited knowledge in science, technology, engineering, and math (STEM) is a problem for scientific progress."

Creates a gap between the scientific consensus and public belief

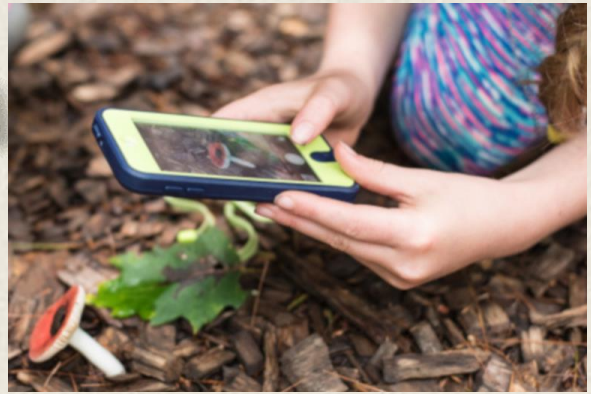
(Pew Research Center, 2015)

Citizen science & the researcher

- Can *process* large amounts of data.
- Can *collect* large amounts of data.
- For some projects, websites have been built to allow volunteers to help scientists analyze or collect data.

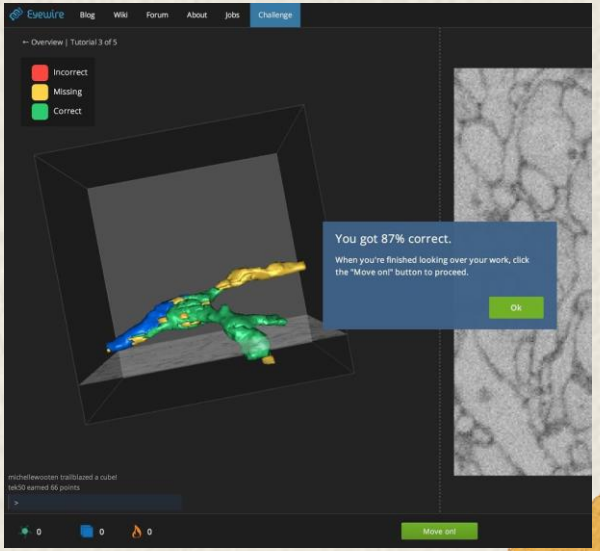
Types of projects

Field-based



Web-based

Games



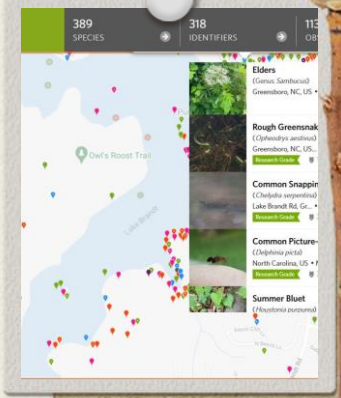
iNaturalist

One of the world's most popular nature apps, iNaturalist helps you identify the plants and animals around you using your phone, computer, or tablet

iNaturalist goals:

Primary - connect people with nature.

Secondary - generate scientifically valuable biodiversity data.



(iNaturalist "What is it" page ;Screenshot of iNaturalist "Explore Observations" page)

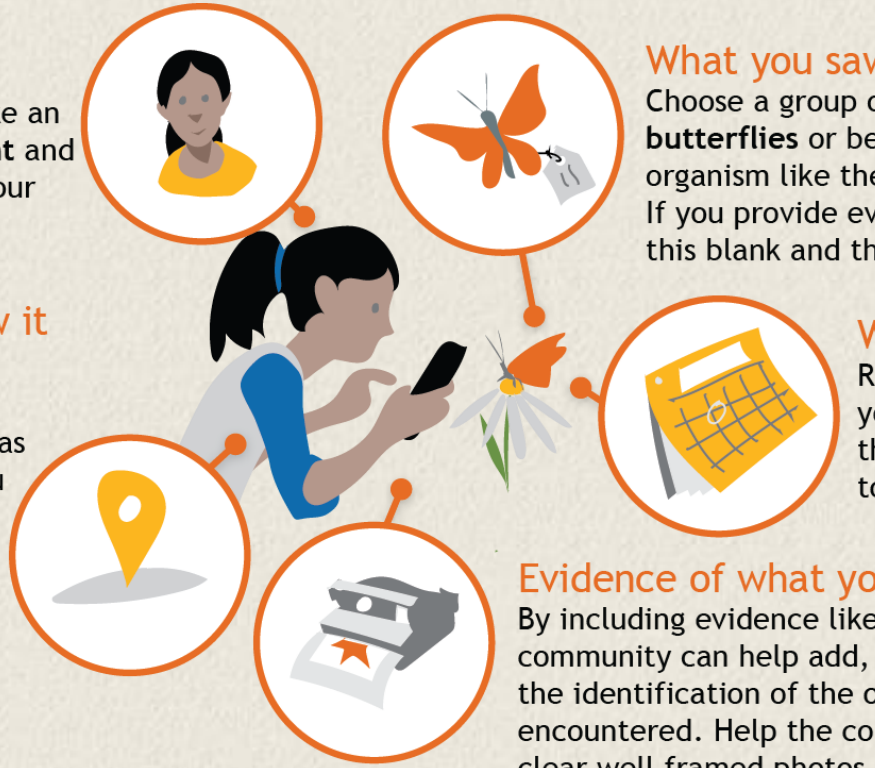
iNaturalist collection protocol

Who you are

You'll need to make an **iNaturalist account** and please only post your own personal observations

Where you saw it

Record both the coordinates of the encounter as well as their accuracy. You can obscure the location from the public



What you saw

Choose a group of organisms like **butterflies** or better yet a specific organism like the **Monarch butterfly**. If you provide evidence you can leave this blank and the **community can help**

When you saw it

Record the date of your encounter, not the date you post it to iNaturalist

Evidence of what you saw

By including evidence like a **photo or sound**, the community can help add, improve, or confirm the identification of the organism you encountered. Help the community by taking clear well framed photos, by including multiple photos from different angles

(From iNaturalist "Getting Started" page)

Where to find observations

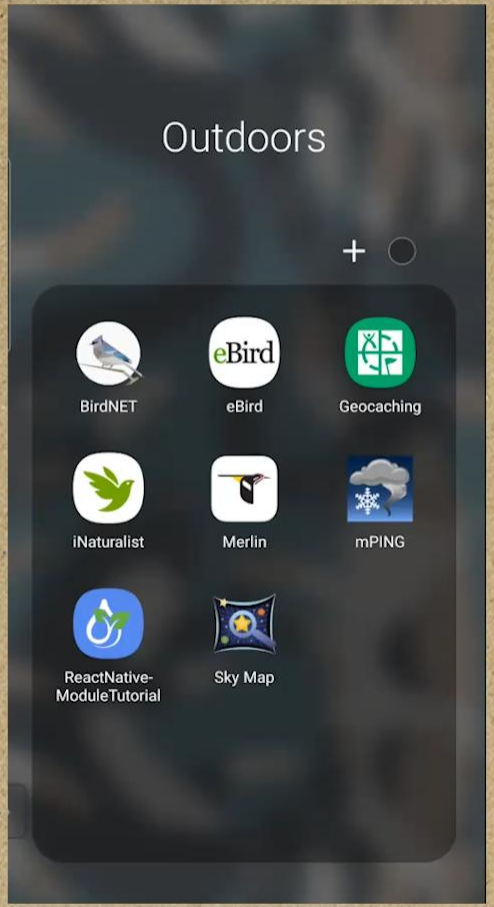
go.uncg.edu/critters

Using iNaturalist

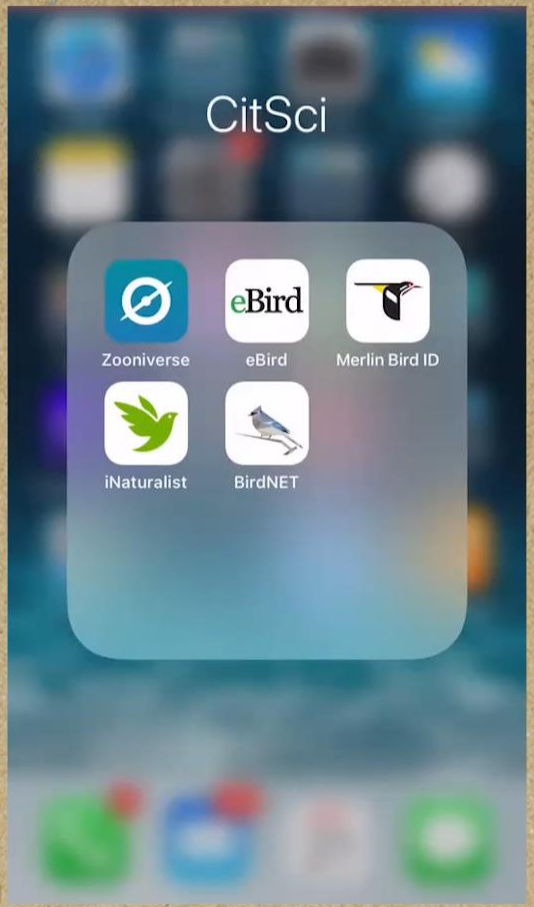
https://www.inaturalist.org

Let's add some observations!

Adding observations



Android



iPhone

You can also use the website!

iNaturalist as a tool for data literacy

- Publicly available and free
- Worldwide community of users
- Variety of data types and conditions
- Filter and view or download data
- Research-grade data*

*How accurate is crowd-sourced data?

Accuracy of crowd-sourced data

Snapshot Serengeti project

June 2010 to May 2013

1.2 million image sets

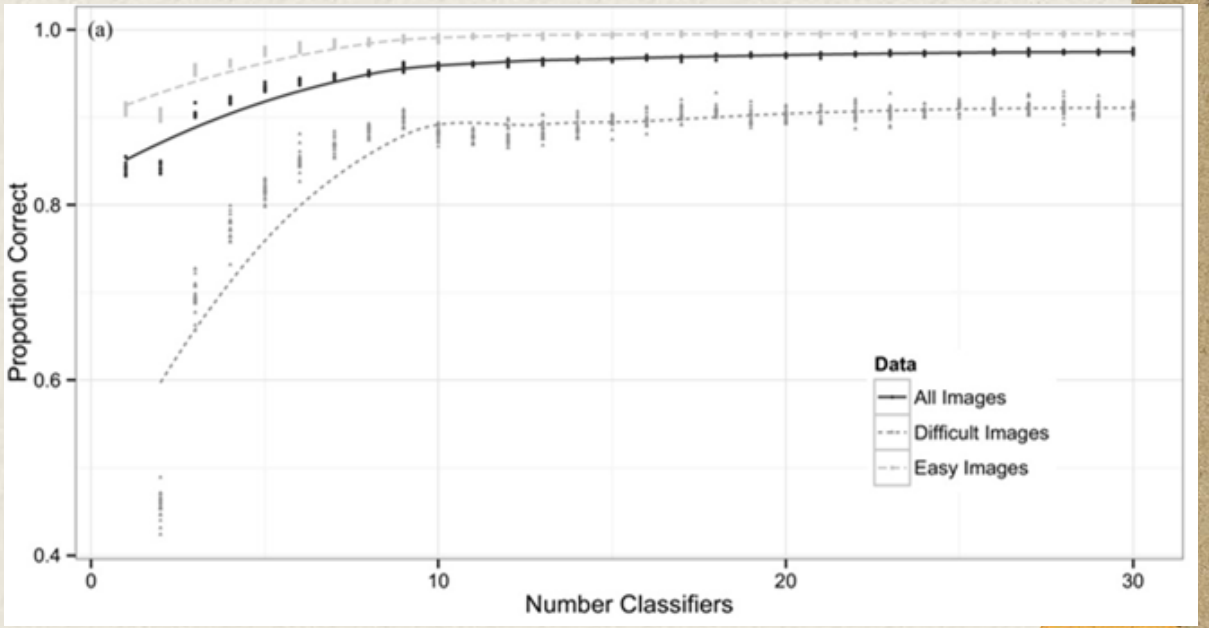
Within 3 days, volunteers:

- contributed 1 million species classifications
- processed an 18-month backlog of images

(Swanson et al., 2016)

Accuracy of crowd-sourced data

- 90% accuracy at 5 classifiers,
- 95% accuracy at 10 classifiers,
- near 98% accuracy after 20 classifiers



(Swanson et al., 2016)

Downloading data

https://www.inaturalist.org

What you can learn with this data

How to:

- Find (and discover)
- Evaluate
- Use
- Credit
- Create (and collect)

(Image by Pexels from Pixabay)

More reasons to use iNaturalist

- Community engagement and outreach
- Learn digital skills
- Democratization of data
- Health and wellness

References

Bounegru, L., Chambers, L., & Gray, J. (Eds.). (2012). *The Data Journal Handbook*. European Journalism Centre. https://datajournalism.com/read/handbook/one/

Carlson, J., Nelson, M. S., Johnston, L. R., & Koshoffer, A. (2015). Developing data literacy programs: Working with faculty, graduate students and undergraduates. *Bulletin of the Association for Information Science and Technology, 41*(6), 14–17. https://doi.org/10.1002/bult.2015.1720410608

Carlton, M., & Leininger, L. (2021). How the scientific method invalidates "fake news". *Teaching about fake news: Lessons plans for different disciplines and audiences* (pp. 221–237). Association of College and Research Libraries. https://libres.uncg.edu/ir/uncg/f/L_Leininger_How_2021.pdf

Dale, J. & Murphy, M. (2018). *UNCG Libraries learning goals and outcomes*. University of North Carolina at Greensboro. http://go.uncg.edu/libslos.

Glusker, A. (2017, September 26). Data literacy: "What it is and why you should care." *Dragonfly.* https://news.nnlm.gov/pnr/data-literacy-what-it-is-and-why-you-should-care/

References

Manduca, C. A. & Mogk, D. W. (2002). *Using data in undergraduate science classrooms* (NSF-0127298). National Science Digital Library. https://d32ogoqmya1dw8.cloudfront.net/files/usingdata/UsingData.pdf

Pew Research Center. (2015). *Public and scientists' views on science and society*. Pew Research Center. https://www.pewresearch.org/science/2015/01/29/public-and-scientists-views-on-science-and-society/

Swanson, A., Kosmala, M., Lintott, C. & Packer, C. (2016), A generalized approach for producing, quantifying, and validating citizen science data from wildlife images. *Conservation Biology, 30*, 520-531. https://doi.org/10.1111/cobi.12695

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